CLAIMS

1. Apparatus for separating an analyte from a mixture or for detecting an analyte or for determining the affinity, or a property related to affinity, between binding partners comprising:

a) a surface having the analyte or one of the binding partners immobilised thereon, in use;

b) a transducer for oscillating the surface;

c) a controller connected to the transducer for varying the amplitude and/or frequency of the oscillation to cause a dissociation event; and,

d) an analyser connected to the transducer for detecting an oscillation of the transducer due to the dissociation event;

characterised in that the controller includes an oscillator connected in a resonant circuit with the transducer such that the transducer oscillates at two frequencies simultaneously, one of these causing the transducer to oscillate the surface and the other being supplied as an output to the analyser.

2. Apparatus according to claim 1, wherein the frequency that is supplied as an output to the analyser is a multiple of the frequency that causes the surface to oscillate.

3. Apparatus according to claim 2, wherein the frequency that causes the surface to oscillate is the transducer's fundamental resonant frequency and the frequency supplied as an output to the analyser is one of the transducer's overtone frequencies.

4. Apparatus according to claim 1, wherein the frequency that causes the surface to oscillate is a multiple of the frequency that is supplied as an output to the analyser.

5. Apparatus according to claim 4, wherein the frequency that causes the surface to oscillate is one of the transducer's overtone frequencies and the frequency supplied as an output to the analyser is the transducer's fundamental frequency.

6. Apparatus according to any of the preceding claims, wherein the oscillation of the transducer due to the dissociation event is at a range of frequencies located around at least one of the transducer's resonant frequencies.

7. Apparatus according to any of the preceding claims, wherein the immobilised analyte or binding partner is a metal, a polymer, a dendrimer, a self-assembled monolayer, a peptide, a protein, an antibody, an antigen, an enzyme, an enzyme inhibitor, a biologically active molecule, a drug, a polynucleotide or a peptide polynucleotide.

8. Apparatus according to any of claims 1 to 6, wherein the immobilised analyte or binding partner is a cell, a bacterium, a virus, a prion, an amyloid, a proteinaceous aggregate or a phage.

9. Apparatus according to any of the preceding claims, wherein different analytes or binding partners are immobilised at different positions on the surface.

10. Apparatus according to any of the preceding claims, wherein the dissociation event is detected as a motional oscillation.

11. Apparatus according to any of the preceding claims, wherein the transducer is a piezoelectric transducer.

12. Apparatus according to claim 11, wherein the transducer is a quartz crystal microbalance or surface acoustic wave device.

13. Apparatus according to claim 11, wherein the transducer comprises zinc oxide, a piezoelectric polymer or a piezo-ceramic.

14. Apparatus according to any of claims 11 to 13, wherein the oscillator is a dual frequency crystal oscillator.

15. Apparatus according to any of the preceding claims, wherein the oscillator comprises two bandpass filters, each having its input connected to the transducer and its output connected to a respective amplifier, the outputs of which are combined by a power adder and supplied to the transducer, the centre frequencies of the bandpass filters

corresponding to the two oscillating frequencies of the transducer.

16. Apparatus according to any of the preceding claims, wherein the analyser comprises a radiofrequency detector and a digitiser.

17. A method for separating an analyte from a mixture or for detecting an analyte or for determining the affinity, or a property related to affinity, between binding partners, the method comprising:

a) immobilising the analyte or one of the binding partners on a surface;

b) oscillating the surface;

c) varying the amplitude and/or frequency of the oscillation to cause a dissociation event; and,

d) detecting an oscillation due to the dissociation event using an analyser;

characterised by oscillating the surface at two frequencies simultaneously, one of these causing the surface to oscillate and the other being supplied as an output to the analyser for use in detecting the oscillation due to the dissociation event.

18. A method according to claim 17, wherein the surface is oscillated using a transducer and the frequency that is supplied as an output to the analyser is a multiple of the frequency that causes the surface to oscillate.

19. A method according to claim 18, wherein the frequency that causes the surface to oscillate is the transducer's fundamental resonant frequency and the frequency supplied as an output to the analyser is one of the transducer's overtone frequencies.

20. A method according to claim 17, wherein the frequency that causes the surface to oscillate is a multiple of the frequency that is supplied as an output to the analyser.

21. A method according to claim 20, wherein the frequency that causes the surface to oscillate is one of the transducer's overtone frequencies and the frequency

supplied as an output to the analyser is the transducer's fundamental frequency.

22. A method according to any of claims 17 to 21, wherein the oscillation of the transducer due to the dissociation event is at a range of frequencies located around at least one of the transducer's resonant frequencies.

23. A method according to either of the preceding claims, further comprising immobilising different analytes or binding partners at different positions on the surface.

24. A method according to any of claims 17 to 23, further comprising detecting the dissociation event as a motional oscillation.